

Ohio's Strawberry, Raspberry, and Blackberry Industry: Potentials and Problems of an Expanding Industry

**CHARLES CARTER, HOMER CARTER, KENNETH ACKERS,
MARK EVANS, ELDEN J. STANG, and ROGER N. WILLIAMS**

**OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
U. S. 250 and Ohio 83 South
Wooster, Ohio**

CONTENTS

* * * *

Introduction----- 3

Part I. Scope of the Industry,
by Charles Carter, Homer Carter, Kenneth Ackers, and Mark Evans----- 5

 Strawberries----- 5

 Blackberries and Raspberries----- 7

Part II. Production and Marketing, by Elden J. Stang----- 9

 Grower Problems----- 10

Part III. Pest Control and Pesticide Use, by Roger N. Williams----- 12

Charles Carter was formerly Agricultural Statistician, Statistical Reporting Service. Homer Carter, Kenneth Ackers, and Mark Evans are Agricultural Statistician in Charge, Agricultural Statistician, and Assistant Statistician in Charge, respectively, Ohio Crop and Livestock Reporting Service, Statistical Reporting Service, U. S. Dept. of Agriculture, Columbus.

Elden J. Stang was formerly Associate Professor of Horticulture, The Ohio State University and Ohio Agricultural Research and Development Center. He is now Associate Professor of Horticulture at the University of Wisconsin.

Roger N. Williams is Associate Professor, Dept. of Entomology, Ohio Agricultural Research and Development Center and The Ohio State University.

Ohio's Strawberry, Raspberry, and Blackberry Industry: Potentials and Problems of an Expanding Industry

INTRODUCTION

Ohio's commercial strawberry, raspberry, and blackberry industry is small when compared to California or Oregon in either acreage or production. The Ohio industry, however, is thriving, progressive, and exhibits great potential for increased growth. Ohio is blessed with the climate, soils, and population which can support significantly greater production of these crops than now exists. With numerous large population centers located throughout the state, producers have a ready outlet for small fruits, especially through direct retail farm marketing or by customer pick-your-own harvesting.

Along with great potential for growth and expansion, the small fruit industry in Ohio also faces production, marketing, and pest control problems common to fruit growers everywhere. This 1976 survey of the commercial strawberry, raspberry, and blackberry industry was designed to examine some of these potentials and problems. It resulted from a cooperative effort by specialists of the Ohio Crop and Livestock Reporting Service, Statistical Reporting Service, and specialists in the Departments of Entomology and Horticulture, The Ohio State University and Ohio Agricultural Research and Development Center.

The survey began with accumulation of known and potential producers. County Cooperative Extension Service agents and state Extension specialists assisted in building the list. For the 1976 berry sur-

vey, a commercial berry farm was determined by satisfying any of the following criteria: 1) at least 0.1 acre of berries in production, 2) intentions to plant 0.1 or more acres of berries in 1977 or 1978, or 3) reported sales of berries for profit. Producers not included in one of these categories were excluded from the summary.

A bulk mailing of 699 questionnaires was made Sept. 24, 1976. Questionnaires returned by the Post Office due to incorrect address, unknown addressee, and other non-deliverable reasons were corrected and remailed if corrections could be found.

Telephone follow-up of non-respondents began on Oct. 28. In all, 650 of the original 699 were contacted, resulting in less than a 7% non-response rate.

The data from the reports of the 239 satisfying the commercial berry farm criteria were summarized, with results shown in the published tables. For purposes of clarity, results are discussed in a three-part report. Part I covers the scope of the industry, Part II production and marketing, and Part III pest control and pesticide use.

Table 2 in Part I (acreage, yield, production, and value of strawberries) reflects 1976 Ohio Crop Reporting Service estimates based on the results of this survey. All other tables reflect actual totals derived from summarization of the commercial producers' reports. Individual producer responses to the survey are confidential and are available only to the Ohio Crop Reporting Service.

This page intentionally blank.

Part I. Scope of the Industry

CHARLES CARTER, HOMER CARTER, KENNETH ACKERS, and MARK EVANS

Ohio berry producers harvested 1,400 acres of strawberries, 110 acres of raspberries, and 35 acres of blackberries in 1976. More than three-fourths of Ohio's berry producers specialized in production of strawberries exclusively (Table 1). About 14% of the berry producers had both strawberries and raspberries in 1976. Only raspberries were produced by 4% of the growers and blackberries by 1%. Only 2% of the berry producers combined all three enterprises.

STRAWBERRIES

Strawberry producers had an average yield of 5,700 lb per acre and received an average of 38 cents per lb or 57 cents per quart. Ohio's total crop of 8 million lb grossed producers slightly more than \$3 million. Two-fifths of the state's production was produced in northeastern Ohio's Stark, Portage, Columbiana, Mahoning, and Wayne counties.

More than half (56%) of Ohio farms with strawberries in 1976 harvested less than 3.0 acres, while approximately 30% of the farms harvested 3.0

to 9.9 acres. Less than 15% of the farms harvested more than 10.0 acres, yet these producers accounted for two-thirds of the state's production. The 50 largest producers each had more than 7.5 acres of strawberries and accounted for 70% of the state's production. Based on these data, only one out of every 1,000 Ohio farms produced strawberries on a commercial basis.

Ohio strawberry growers who produced 10 or more acres in 1976 had 46% of the total acreage and 53% of the production. Growers producing less than 5 acres accounted for 31% of the total acreage; those with 5.0-7.4 acres, 12%; and those with 7.5-9.9 acres, 11% of the total production.

Producers generally have a replacement program for older strawberry beds. Data for 1975 and 1976 planted acreage suggest a rather stable replacement program (Table 6). The number of intended plantings for 1978 suggest that the less than 4-acre category is down sharply from earlier years, while those expecting to plant 4 acres or more are relatively

TABLE 1.—Berries: Number of Growers Reporting Berries Produced by Kind and Percent, Ohio, 1976.

Kind	1976	
	Number	Percent
Strawberries only	183	77
Raspberries only	10	4
Blackberries only	3	1
Strawberries and Raspberries	33	14
Strawberries and Blackberries	4	2
Raspberries and Blackberries	0	0
Strawberries, Blackberries, and Raspberries	6	2
	239	100

TABLE 3.—Strawberries: Ten Leading Counties Reporting in 1976 Survey, by Acres Harvested and Yield per Acre, Ohio, 1976.

Rank	Acres Harvested, 1976	Yield per Acre, 1976
1	Stark	Harrison
2	Portage	Wayne
3	Miami	Coshocton
4	Columbiana	Clark
5	Coshocton	Miami
6	Mahoning	Licking
7	Franklin	Wyandot
8	Wayne	Cuyahoga
9	Warren	Lucas
10	Montgomery	Madison

TABLE 2.—Strawberries: Acreage, Yield, Production, and Value, by Crop Reporting District, Ohio, 1976.

District	Acreage Harvested	Yield	Production	Price per Pound	Value
	acres	cwt	cwt	\$	\$1,000
1	80	60	4,800	0.42	202
2	160	50	8,000	0.37	296
3	560	55	30,800	0.40	1,232
4	110	80	8,800	0.35	308
5	130	45	5,850	0.37	216
6	120	85	10,200	0.34	347
7	150	55	8,250	0.37	305
8	30	30	900	0.40	36
9	60	40	2,400	0.41	98
State	1,400	57	80,000	0.38	3,040



STRAWBERRIES

Strawberry acreage in Ohio in 1976 was estimated at 1,400 acres. Northeast Ohio (District 3) led the state in acreage harvested with 40% of this total. North Central (District 2) and Southwest (District 7) Ohio each had 11% of the state's total acreage. The state average yield in 1976 was 57 cwt per acre, giving a total crop of 80,000 cwt.

constant. Some growers may have preferred not to commit themselves on future plantings.

BLACKBERRIES AND RASPBERRIES

Based on the 1976 survey, commercially harvested blackberry acreage in Ohio is very small, totaling 35.0 acres in 1976. Only a few farms reported producing blackberries in 1976. Most of these farms harvested less than 2 acres. Yields averaged 24 cwt per acre and returned 45 cents per lb or \$1,080 per acre.

Ohio's commercial raspberry producers harvested 110 acres in 1976. The number of commercial producers is also very small compared to straw-

TABLE 4.—Strawberries: Number of Farms Reporting Acreage Harvested, by Size Group, Ohio, 1976.

Size Group Acres	Farms 1976
0.1 - 0.4	33
0.5 - 0.9	32
1.0 - 1.9	36
2.0 - 2.9	27
3.0 - 3.9	14
4.0 - 4.9	13
5.0 - 7.4	25
7.5 - 9.9	15
10.0 - 14.9	15
15.0 - 19.9	4
20.0 - 29.9	8
30.0 and more	4
	226

TABLE 5.—Strawberries: Acreage, Yield, and Production Estimate by Acreage Size Group, Ohio, 1976.

Size of 1976 Strawberry Acreage	Total Acreage Harvested	Yield	Production
acres	acres	cwt	cwt
0.1 - 4.9	430	50	37,500
5.0 - 7.4	170		
7.5 - 9.9	150		
10.0 and more	650	65	42,500
	1,400	57	80,000

TABLE 6.—Strawberries: Number of Strawberry Growers Responding to 1976 Survey Indicating Strawberry Acreage Planted in 1975 and 1976 and Expected to Plant Acreage in 1977 and 1978.

Crop Reporting District	1975		1976		1977		1978	
	Size of Strawberry Acreage		Size of Strawberry Acreage		Size of Strawberry Acreage		Size of Strawberry Acreage	
	0.1 - 3.9	4.0+	0.1 - 3.9	4.0+	0.1 - 3.9	4.0+	0.1 - 3.9	4.0+
Number of Growers								
1	15	2	14	4	15	3	9	3
2	24	4	26	7	22	5	16	5
3	34	19	38	17	38	22	24	18
4	6	2	8	2	8	3	4	1
5	18	6	13	9	14	7	11	6
6	4	2	5	1	4	2	3	3
7	12	2	15	5	11	5	8	6
8	7	2	17	4	16	1	14	2
9	6	2	7	2	7	2	4	1
State	126	41	143	51	135	50	93	45
	167		194		185		138	

TABLE 7.—Blackberries and Raspberries: Acreage, Yield, Production, and Value Reported on a 1976 Survey, Ohio.

Crop Reporting District and State	Harvested Acreage	Yield	Production	Price per Pound	Value
	acres	cwt	cwt	\$	\$1,000
Blackberries					
State	35.0	24	840	0.45	38
Raspberries					
District 3	45.0	24	1,080	0.58	63
State	110.0	18	1,980	0.62	123

berry producers. Nearly two-thirds of these producers harvested less than 2 acres in 1976. The output per acre averaged 18 cwt per acre, with an average return of 62 cents per lb or \$1,116 per acre.

Producers in District 3 (Northeast) accounted for two-fifths of Ohio raspberry acreage in 1976. Yields were somewhat better in District 3, with an average output of 24 cwt per acre, up 6 cwt from the state average. The return per acre averaged \$1,392 per acre.

TABLE 8.—Blackberries and Raspberries: Number of Farms by Size of Acreage Harvested, Ohio, 1976.

Acres	Blackberries	Raspberries
	1976	1976
	Farms	
0.1 - 0.4	5	15
0.5 - 0.9	2	8
1.0 - 1.9	3	10
2.0 - 2.9		5
3.0 - 3.9		1
4.0 - 4.9		3
5.0 and more	3	7
Total	13	49

Part II. Production and Marketing

ELDEN J. STANG

Newer, more productive, disease-resistant cultivars are the primary ingredients for a thriving small fruit industry in Ohio. Although 20 or more strawberry cultivars are produced in Ohio, four cultivars make up more than 82% of the acreage harvested (Table 1). The mid-season cultivars—Guardian (26.8%), Midway (23.8%), Redchief (20.7%) and Surecrop (11.3%)—predominate, with older cultivars such as Catskill, Robinson, Vesper, Pocahontas, and others each ranging from 0.2%-1.2% of total acreage. Earliglow, the most recent USDA introduction, is a high quality, early season cultivar rapidly increasing in acreage. It is expected to become the predominant early season berry in commercial plantings in Ohio.

Except for 'Heritage', one of the newer ever-bearing red raspberry cultivars rapidly increasing in commercial acreage, raspberry production in Ohio is based on older, proven cultivars such as 'Bristol' black raspberry (70% of 1976 acreage) and the June bearing 'Latham' red raspberry (7.4% of 1976 acreage) (Table 2). Acreage in 'Heritage' (23% in 1976) is expected to increase further as producers and consumers accept this attractive, productive cultivar and a different harvest season. Increased efficiency with reduced labor requirements in production of this fall-bearing cultivar make commercial acceptance more likely as familiarity with it increases.

With increasing difficulty in obtaining sufficient labor for harvesting, small fruit producers have shifted rapidly to on-farm marketing, primarily through customer pick-your-own (PYO) (Table 3). In strawberries, 75% of all harvesting is done by customers. In raspberries, more than 66% of all fruit produced is harvested by PYO. As blackberry production increases, acreage harvested by PYO is also expected to continue to increase.

Retail sales, largely the on-farm sales of small fruit, reflect the predominance of the PYO harvesting method, particularly in strawberries. In raspberry production, however, 19% of the fruit is harvested by hired labor or family members and is apparently retailed at the farm, with only a small percentage sold wholesale to other farm markets or stores. All blackberries produced were sold at retail by the one producer reporting sales in 1976.

The number of customers required to harvest an acre of small fruits by PYO is often of interest to prospective growers (Table 4). Approximately 300 customers were involved in PYO harvesting of an acre of strawberries or blackberries. Based on the

TABLE 1.—Strawberries: Cultivars by Percent of Acreage Harvested, Ohio, 1976.

Cultivar	Percent	Cultivar	Percent
Guardian	26.8	Robinson	0.6
Midway	23.8	Sparkle	0.5
Redchief	20.7	Vesper	0.4
Surecrop	11.3	Delite	0.4
Fletcher	4.7	Marlate	0.3
Raritan	4.4	Tennessee Beauty	0.2
Earliglow	1.4	Darrow	0.2
Sunrise	1.2	Midland	0.1
Catskill	1.1	Pocahontas	0.1
Earlidawn	0.8		
Redglow	0.8	Total	100.0

TABLE 2.—Raspberries: Type Produced and Cultivars by Percent of Acreage Harvested, Ohio, 1976.

Type	Percent
Black	
Bristol	69.7
Red	
Heritage (everbearing)	22.9
Latham (June bearing)	7.4
Purple	
Total	100.0

TABLE 3.—Strawberries, Raspberries, and Blackberries: Method of Harvest and Type of Sale, Ohio, 1976.

Item	Strawberries	Raspberries	Blackberries
	%	%	%
Method of Harvest			
Pick-Your-Own	74.7	65.8	50.0
Hired Labor (including family members)	25.3	34.2	50.0
Total	100.0	100.0	100.0
Type of Sale			
Wholesale	24.5	15.2	
Retail	75.5	84.8	100.0
Total	100.0	100.0	100.0

TABLE 4.—Strawberries, Raspberries, and Blackberries: Customers per Acre and Number of Units per Customer, Ohio, 1976.

Item	Strawberries	Raspberries	Blackberries
Customers per Acre			
Average	307	168	300
Lb Sold per Customer			
Average	18.9	8.3	10.0

average yields reported previously, individual sales averaged 18.9 lb for strawberries and 10 lb for blackberries. Lower per acre yields occur in raspberry production. With this crop, unit sales of 8.3 lb involved 168 individual sales.

TABLE 5.—Strawberries, Raspberries, and Blackberries: Producers' Years of Experience, Ohio, 1976.

Years	Strawberry		Raspberry		Blackberry	
	No.	%	No.	%	No.	%
1-2	5	13	6	37	1	50
3-5	7	17	3	19		
6-9	6	15	2	13		
10+	22	55	5	31	1	50
Median Years	10+		3-5		6-9	

TABLE 6.—Strawberries: Problems Encountered by Producers Ranked from Most Important (1) to Least Important (5), Number Reporting Within Each Category, Ohio, 1976.

Rank of Problems	Strawberry					Total
	1	2	3	4	5	
Plant Quality		1	2			3
Availability of Plant Stocks		1			1	2
Variety Choices		1	4	2	3	10
Weed Control	26	9	1	2	1	39
Disease Control		4	5	4	5	18
Insect and Mite Control		2	4	3	3	12
Labor	2	6	2	5	1	16
Frost Losses	9	7	3	2		21
Irrigation Water Supply	2	2	4	2	2	12
Fertilizer				4	1	5
Handling the Customer		1	4	3	4	12
Bed Renovation		3	6	4	4	17
Bird Damage		1	2	1	4	8
Fumigation (Preplant)	1	1				2

TABLE 7.—Raspberries and Blackberries: Problems Encountered by Producers Ranked from Most Important (1) to Least Important (5), Number Reporting Within Each Category, Ohio, 1976.

Rank of Problems	Raspberry/Blackberry					Total
	1	2	3	4	5	
Plant Quality		1	1	1	1	4
Availability of Plant Stocks	1	2		1	1	5
Variety Choices			2			2
Weed Control	4	4	3			11
Disease Control	8	3	1		1	13
Insect and Mite Control		1				1
Labor		3		1	2	6
Frost Losses	2		2	1		5
Irrigation Water Supply		1				1
Fertilizer				2		2
Handling the Customer				1		1
Bed Renovation				1		1
Bird Damage			2	1	3	6

Despite somewhat lower per acre yields for raspberries and blackberries in comparison with strawberries, gross returns averaged \$1,116, \$1,080, and \$2,171 per acre, respectively, for raspberries, blackberries, and strawberries in 1976. Repeat sales no doubt accounted for a significant percentage of the total customers involved, although this survey did not establish the number of repeat sales to the same individual or family.

A predominant number of Ohio's strawberry producers are experienced growers, with 55% reporting 10 or more years of production of this crop. Growth in raspberry production acreage is more recent, with all producers reporting an average of 3-5 years experience and 57% reporting less than 5 years in production of this crop. One of the two blackberry producers reporting indicated experience exceeding 10 years. Production of these small fruits can be projected to increase significantly over the next several years as new acreage comes into full bearing potential.

GROWER PROBLEMS

As with other agricultural commodities, small fruit producers face a variety of production, harvesting, and marketing problems (Table 6). In this survey, producers were asked to rank a series of potential problems often encountered in strawberry and raspberry production from 1 (most important) to 5 (least important).

In strawberries, weed control was considered by two-thirds of the growers to be the primary production problem. Other production problems of greatest concern included losses to frost, labor problems, disease control, and planting bed renovation. Of lesser concern were such factors as availability of water for irrigation, some problems in handling customers, insect and mite control, and bird damage to plantings.

In raspberry and blackberry production, problems in disease control were considered to be the predominant limiting factor by 60% of the respondents in this category (Table 7). As with strawberries, weed control problems were also considered to be a major concern, with significant concern for other factors such as labor, availability of planting stock, frost losses, and bird damage. Specific labor problems were not designated in this survey. Producers in private conversations, however, repeatedly point out the difficulty of obtaining sufficient experienced labor for harvesting these crops.

In addition to information on problems currently facing the industry, small fruit producers were requested to designate primary sources of production and marketing information (Table 8). Approximately 50% of strawberry and raspberry producers

indicated they obtained information either from Ohio pest control publications and by direct or indirect contact with Ohio's state and county faculty in the Cooperative Extension Service, the Ohio Agricultural Research and Development Center, or teaching faculty at The Ohio State University. Considerable contact is obtained through grower participation in area and state fruit schools. Additional important sources of information included fellow growers, chemical suppliers, and trade literature such as magazines or commercial newsletters.

Producer outlook for the future of an agricultural industry can reflect economic health and potential for expansion. Responses to a request in this survey for indications of grower outlook for the future of the strawberry, raspberry, and blackberry industries generally project a highly optimistic outlook.

Among respondents, 86% of the strawberry producers indicated a favorable or very favorable outlook, along with 77% and 45% of the raspberry and blackberry producers, respectively. Significant numbers of growers indicated the outlook for small fruit production to be improving. Although reasons were not specified, 18% of the producers suggested a poor outlook at this time for commercial production of blackberries in Ohio.

The predominantly optimistic outlook for small fruit production among producers suggests that production of these crops will continue to expand, to the mutual benefit of Ohio's producers and consumers.

TABLE 8.—Strawberries, Raspberries, and Blackberries: Sources of Grower Production and Marketing Information, Percent Response in Each Category, Ohio, 1976.

	Strawberries	Raspberries/ Blackberries
	%	%
Fellow Growers	22.7	29.7
Chemical Dealers	9.3	8.3
Cooperatives	0.9	
Fieldmen	0.4	
OSU, OARDC, State and County Specialists	22.8	18.3
Trade Literature	13.2	5.3
Ohio Spray Guide	24.7	35.7
Other	3.0	0.7
None	3.0	2.0
	100.0	100.0

TABLE 9.—Strawberries, Raspberries, and Blackberries: Growers' Outlook for Commercial Production, Percent by Category, Ohio, 1976.

Category	Strawberries	Raspberries	Blackberries
	%	%	%
Very Favorable	43	32	37
Favorable	43	45	18
Improving	11	18	27
Poor			18
Very Poor	3	5	
Total	100	100	100

Part III. Pest Control and Pesticide Use

ROGER N. WILLIAMS

A portion of the survey was devoted to learning more about the pest problems and pesticide usage of this portion (excluding grapes) of the state's small fruit industry. The objectives were: 1) to gain a better insight of the problems, 2) to summarize them for the grower, 3) to identify possible areas where future studies might be needed, and 4) to pinpoint

problems which should be covered in future fruit industry meetings.

This is the first time in the history of small fruit surveys of Ohio that this type of information has been sought. It is felt that it will be of interest to both growers and agribusiness. It tends to illustrate some problems unique to Ohio and yet not shared by nearby states.

The boom-type sprayer was used by the majority of strawberry, raspberry, and blackberry growers surveyed. The remainder, representing about one-third of the growers, used alternate systems listed in Table 1. In the past few years, some strawberry growers have switched from boom to air blast for pesticide applications.

Some 97% of the growers reported using herbicides; however, 40% of these indicated that control was not satisfactory. Results of fungicide and insecticide usage were much more encouraging. About 89% of the growers using fungicides thought they were obtaining satisfactory disease control. Even a greater proportion (97%) of those using insecticides reported good results.

In the Ohio Commercial Spray Guide, an application of 250-300 gallons per acre on strawberries is considered a dilute spray. When the low volume rate per acre is used, more of the desired pesticide adheres to the target and thus less of the formulation is recommended. It appears that the majority of Ohio growers are taking advantage of the 20% reduction in pesticides provided by low volume application. Until this survey, the authors had little concept of the information covered in Table 2. The data provide a base line upon which to make future pesticide comparisons.

Strawberry growers were asked to indicate which of six pests had given them problems in 1976 (Table 3). If a pest had caused losses, the number of pesticide treatments was indicated. It was expected that slug and mite problems would be experienced by many growers, but the overwhelming importance given to spittlebugs was not anticipated. If the number of sprays used to control a specific pest was used as the criteria to determine pest importance, then clipper, sap beetle, and mites would be dominant.

Bramble growers were also questioned about major insect pests (Table 4). Aphids were added due to write-in reports. Problems were scattered fairly uniformly among the insects mentioned. This information is quite useful in pinpointing problem

TABLE 1.—Type of Sprayer Used in Small Fruit Production, Ohio, 1977.*

Type	Percent
Hydraulic	5
Boom	66
Air blast	27
Fixed wing aircraft	2

*Strawberry, raspberry, and blackberry only. Does not include grape.

TABLE 2.—Herbicides, Fungicides, and Insecticides Used on Strawberry, Raspberry, and Blackberry: Application Rates by Sprayer Type, Gallons per Acre, Pump Pressure, and Driving Speed, Ohio, 1977.*

Type	Herbicide	Fungicide	Insecticide
Boom sprayer			
Gallons per acre average (gal)	47.7	82.2	82.2
Pump pressure average (psi)	59.4	200.5	200.5
Driving speed average (mph)	3.2	3.5	3.5
Air Blast			
Gallons per acre average (gal)	53.3*	45.0	45.0
Pump pressure average (psi)	30.0*	174.0	174.0
Driving speed average (mph)	2.5*	3.1	3.1

*It is assumed that where air blast sprayers were indicated for use with herbicides, a proper boom attachment was used to direct application.

TABLE 3.—Strawberries: Type of Pest, Number of Growers with Pest Problems, Average and Range of Spray Applications, Ohio, 1977.

	Strawberry Spray Applications		
	Number of Growers	Average	Range
Mites	9	2.1	1-4
Clipper	1	8.0	
Spittlebug	25	1.2	1-4
Sap Beetle	4	3.0	2-4
White Grub	4	1.0	
Slug	11	1.0	

areas. It appears that fruitworms may emerge as one of the most important problems. It is known that the fruitworms and Japanese beetles have a preference for the fruit of red raspberries. With the increased production of Heritage and other red raspberry cultivars, monitoring for these pests will continue.

When asked about certification to use restricted use pesticides, growers reported that: 9% were already certified, 46% were interested in becoming certified, 18% were not interested, and 27% were undecided. It should be kept in mind that this information was gathered in early 1977 and the figures do not include those who took the training and examination in 1977. Now that there is a list of likely restricted use compounds, growers will have a better idea if they can get by with general use pesticides.

In summary, several primary needs were identified by the *pests* and *pesticides* portion of the survey.

TABLE 4.—Raspberries and Blackberries: Type of Pest, Number of Growers with Pest Problems, Average and Range of Spray Applications, Ohio, 1977.

	Raspberry/Blackberry Spray Applications		
	Number of Growers	Average	Range
Crown Borer	1	1.0	
Cane Borer	2	2.0	
Scale Insects			
Fruitworm	3	3.6	1-8
Japanese Beetle	3	1.5	1-2
Picnic Beetle	1	2.0	
Aphids	2	1.0	

1) Weed control and the use of herbicides is the key problem area; 2) although not pointed out specifically on the survey, more information is needed on the pesticides being used in order to retain these products for the fruit industry; and 3) a convenient method is needed to control slugs and several other pests.

BETTER LIVING IS THE PRODUCT

of research at the Ohio Agricultural Research and Development Center. All Ohioans benefit from this product.

Ohio's farm families benefit from the results of agricultural research translated into increased earnings and improved living conditions. So do the families of the thousands of workers employed in the firms making up the state's agribusiness complex.

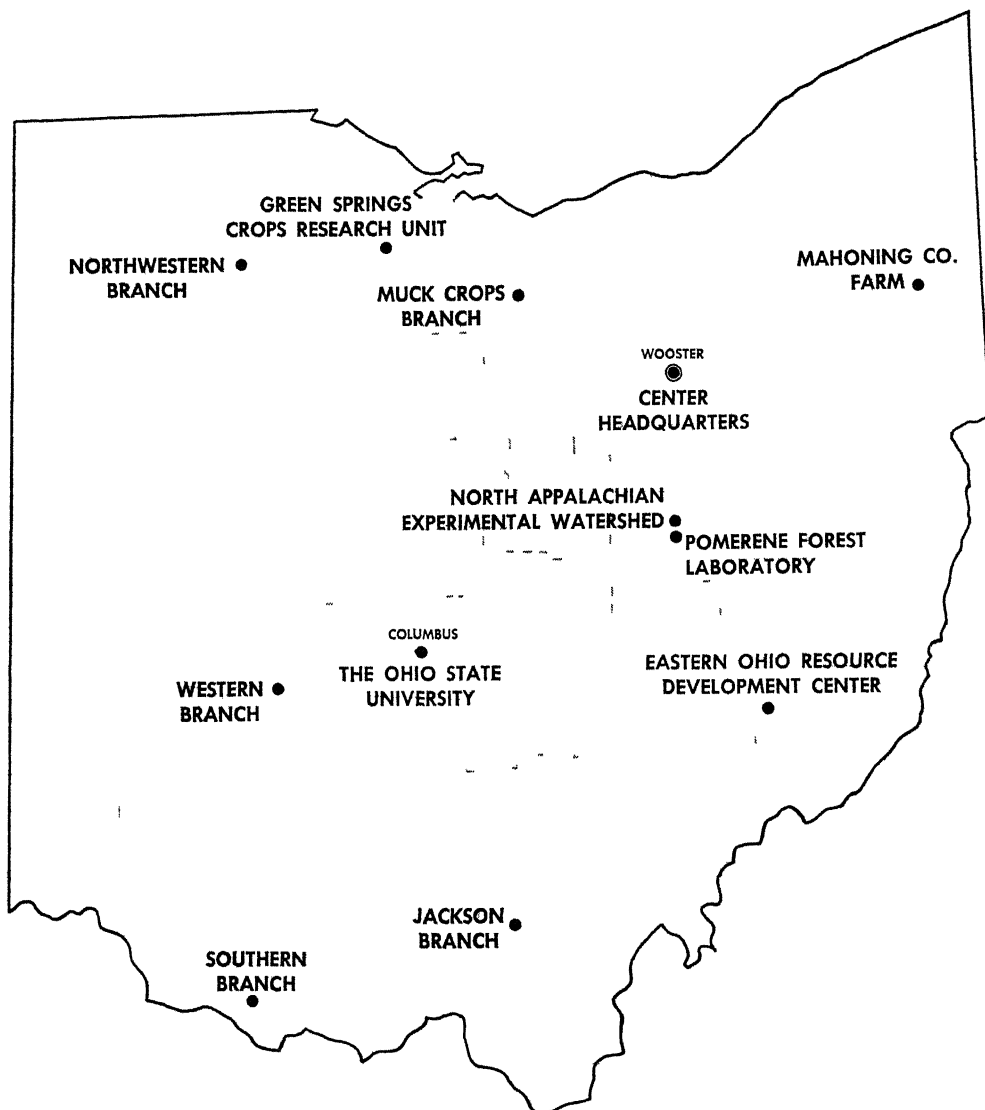
But the greatest benefits of agricultural research flow to the millions of Ohio consumers. They enjoy the end products of agricultural science—the world's most wholesome and nutritious food, attractive lawns, beautiful ornamental plants, and hundreds of consumer products containing ingredients originating on the farm, in the greenhouse and nursery, or in the forest.

The Ohio Agricultural Experiment Station, as the Center was called for 83 years, was established at The Ohio State University, Columbus, in 1882. Ten years later, the Station was moved to its present location in Wayne County. In 1965, the Ohio General Assembly passed legislation changing the name to Ohio Agricultural Research and Development Center—a name which more accurately reflects the nature and scope of the Center's research program today.

Research at OARDC deals with the improvement of all agricultural production and marketing practices. It is concerned with the development of an agricultural product from germination of a seed or development of an embryo through to the consumer's dinner table. It is directed at improved human nutrition, family and child development, home management, and all other aspects of family life. It is geared to enhancing and preserving the quality of our environment.

Individuals and groups are welcome to visit the OARDC, to enjoy the attractive buildings, grounds, and arboretum, and to observe first hand research aimed at the goal of Better Living for All Ohioans!

The State Is the Campus for Agricultural Research and Development



Ohio's major soil types and climatic conditions are represented at the Research Center's 12 locations.

Research is conducted by 15 departments on more than 7000 acres at Center headquarters in Wooster, seven branches, Green Springs Crops Research Unit, Pomerene Forest Laboratory, North Appalachian Experimental Watershed, and The Ohio State University.

Center Headquarters, Wooster, Wayne County: 1953 acres

Eastern Ohio Resource Development Center, Caldwell, Noble County: 2053 acres

Green Springs Crops Research Unit, Green Springs, Sandusky County: 26 acres

Jackson Branch, Jackson, Jackson County: 502 acres

Mahoning County Farm, Canfield: 275 acres

Muck Crops Branch, Willard, Huron County: 15 acres

North Appalachian Experimental Watershed, Coshocton, Coshocton County: 1047 acres (Cooperative with Agricultural Research Service, U. S. Dept. of Agriculture)

Northwestern Branch, Hoytville, Wood County: 247 acres

Pomerene Forest Laboratory, Coshocton County: 227 acres

Southern Branch, Ripley, Brown County: 275 acres

Western Branch, South Charleston, Clark County: 428 acres